Cutting Edge Technology to Help Bio-medical Researchers Find New Treatments and Cures

A state of the art confocal microscope will complete Stage 1 of a Correlative Light and Electron Microscopy (CLEM) Suite to be housed within Kids Research Institute for the use of researchers across the Westmead Research Hub.

The confocal microscope, an instrument that uses laser light to obtain optical sections through cells and tissues, is cutting-edge technology that will enable researchers to be at the forefront of biomedical research into new treatments and cures.

Microscopes are the central tool for cell biologists investigating the causes of a wide range of human diseases. During the last 10 years there have been enormous advances in microscope technology.

“We will be able to observe things in cells that we have never been able to see before. Because a cell is the basic unit of life in our bodies, it is also the place where things first go wrong when diseases develop, and the place where new treatments first act to repair damage and alleviate symptoms”, said Dr Laurence Cantrill, the Advanced Microscopy and Imaging Specialist at Kids Research Institute.

“Using the latest techniques in microscopy keeps us at the forefront of understanding the types of disease related changes that occur in cells, which among the thousands of types of cells in the human body are affected by disease, and why they are affected in the ways observed.

With this basic knowledge our researchers can then target their efforts to develop new treatments and cures, often from the standpoint of unexpected observations revealed by the beautiful images of life that we obtain when looking down microscopes.”

The CLEM Suite includes a portable high pressure freezer, which is the key component that will enable researchers to instantaneously transform the living cells they have just observed via confocal microscopy into a well preserved “snap frozen” form ready to be processed for observation with electron microscopes. Scientist can therefore “correlate” the activity in the living cells they observe with the fine structure of the components that organise and control them.

The new technology will be integrated with the electron microscopes available at the Transmission Electron Microscopy Laboratory at Westmead Hospital. This funding also comes at a time when the current microscopes available are either booked to capacity or are reaching the end of their usable lives.

The purchase of the confocal microscope, thanks to a $290,000 grant from Cancer Institute NSW will complete Stage 1 of the Correlative Light and Electron Microscopy (CLEM) Suite.

“The CLEM Suite project is very exciting as it will synergise new imaging technology for research with existing imaging equipment and expertise. It also builds on our strength as a centre for cell biology and imaging in the lead up to the construction of a Hub Core Platform Facility as part of the future development of the Westmead Research Hub. This will house high-end shared facilities
such as the CLEM Suite. The CLEM Suite also offers great scope for collaboration between scientists at Kids Research Institute and those at other institutions throughout Sydney, “said Dr Cantrill.

Kids Research Institute, the research arm of The Children’s Hospital at Westmead, has been working hard in collaboration with partners at the Children’s Hospital at Westmead Clinical School, Westmead Millennium Institute, Children’s Medical Research Institute and the University of Sydney to raise funds to invest in the latest developments in confocal laser scanning microscopy and to integrate this technology with the electron microscopes available at the Transmission Electron Microscopy Laboratory at Westmead Hospital. A 200kV FEI Tecnai electron microscope was purchased by the Westmead Research Hub in 2008.

Dr Cantrill and Dr Geraldine O’Neill from the Children’s Cancer Research Unit at Kids Research Institute have coordinated a large number of grant applications to raise funds to purchase the equipment for the project. The recent award to Dr O’Neill and a team of collaborating cancer researchers from across the Westmead campus is the culmination of over 18 months of work. Previous funding successes have included the University of Sydney NHMRC Major Equipment Scheme and the Sydney School of Medicine Research Infrastructure Scheme (both led by Prof Kathryn North), an award from Perpetual Trustees (also awarded to Dr O’Neill), and gifts directly to Kids Research Foundation from the Ian Potter Foundation and the Valerie Street Estate bequest, with the remaining funds contributed by the collaborating institutions.